

1a  $A \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} \quad B \begin{pmatrix} 7 \\ -4 \\ 13 \end{pmatrix} \quad C \begin{pmatrix} 8 \\ -6 \\ 15 \end{pmatrix}$

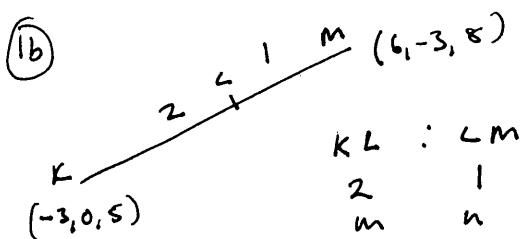
$\vec{AC} = c - a$

$$\begin{pmatrix} 8 \\ -6 \\ 15 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 5 \\ -10 \\ 10 \end{pmatrix} = 5 \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$$

b.  $\vec{AB} = b - a$

$$\begin{pmatrix} 7 \\ -4 \\ 13 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} = \begin{pmatrix} 4 \\ -8 \\ 8 \end{pmatrix} = 4 \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$$

$\begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix} \quad 5\vec{AC} = 4\vec{AB}$   
and A is common Point  
then ABC are collinear



$$L = \frac{mb + na}{m+n}$$

$$L = \frac{2b + a}{3}$$

$\vec{KL} = L - K \quad \vec{LM} = M - L$

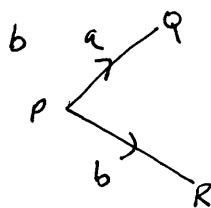
$$L = 2 \begin{pmatrix} 6 \\ -3 \\ 8 \end{pmatrix} + \begin{pmatrix} -3 \\ 0 \\ 5 \end{pmatrix}$$

$$L = \begin{pmatrix} 12 \\ -6 \\ 16 \end{pmatrix} + \begin{pmatrix} -3 \\ 0 \\ 5 \end{pmatrix} = \begin{pmatrix} 9 \\ -6 \\ 21 \end{pmatrix}$$

$$L = \frac{1}{3} \begin{pmatrix} 9 \\ -6 \\ 21 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \\ 7 \end{pmatrix}$$

co-ord L = (3, -2, 7)

$$\begin{pmatrix} 3 \\ -1 \\ 1 \end{pmatrix} \times \begin{pmatrix} 2 \\ 0 \\ 3 \end{pmatrix} = \begin{pmatrix} 6 \\ 0 \\ 3 \end{pmatrix} = 9$$



$$\cos \theta = \frac{a \cdot b}{|a||b|}$$

$$\cos \theta = \frac{9}{|a||b|}$$

$$|a| = \sqrt{3^2 + (-1)^2 + 1^2} \quad |b| = \sqrt{2^2 + 0^2 + 3^2}$$

$$= \sqrt{11} \quad = \sqrt{13}$$

$$\cos \theta = \frac{9}{\sqrt{11}\sqrt{13}} = 0.752677$$

$$\theta = 41.16^\circ$$

### Outcome 2

3a  $\frac{dy}{dx} (-5 \sin x) = -5 \cos x$

b  $\frac{dy}{dx} \left( \frac{1}{3} \cos x \right) = -\frac{1}{3} \sin x$

(4)  $f(x) = (x+4)^{-3}$

$f'(x) =$

Let  $u = (x+4)$   $y = u^{-3}$

$$\frac{du}{dx} = 1$$

$$\frac{dy}{du} = -3u^{-4}$$

$$\frac{dy}{dx} = \frac{du}{dx} \times \frac{dy}{du}$$

$$\frac{dy}{dx} = -3u^{-4} \times 1$$

$$\frac{dy}{dx} = -3(x+4)^{-4}$$

$$= -\frac{3}{(x+4)^4}$$

$$\textcircled{5} \int 5 \cos x \, dx$$

$$= 5 \sin x + c$$

$$b) \int -\frac{2}{3} \sin x \, dx$$

$$= -\frac{2}{3} - \cos x + c$$

$$= \frac{2}{3} \cos x + c$$

$$c) \int_3^4 (x-2)^4 \, dx$$

$$= \left[ \frac{(x-2)^5}{5 \times 1} \right]_3^4$$

$$\frac{(4-2)^5}{5} - \frac{(3-2)^5}{5 \times 1}$$

$$\frac{2^5}{5} - \frac{1^5}{5}$$

$$\frac{32}{5} - \frac{1}{5} = \frac{31}{5} = 6 \frac{1}{5}$$

Outcome 3

$$6a \log_a 8 + \log_a 5$$

$$= \log_a (8 \times 5)$$

$$= \log_a 40$$

$$b. 5 \log_4 2 - \log_4 8$$

$$= \log_4 2^5 - \log_4 8$$

$$= \log_4 32 - \log_4 8$$

$$= \log_4 \left( \frac{32}{8} \right)$$

$$= \log_4 4$$

$$= 1$$

$$7a \text{ If } x = \frac{\log_e 13}{\log_e 5}$$

$$=$$

$$b) \log_{10} y = 2.6$$

$$y = 10^{2.6}$$

$$c) y = 10^{3.4}$$

$$= 2.511886432$$

Outcome 4

$$3 \cos x + 2 \sin x \quad k \cos(x-\alpha)$$

$$\text{use } k \cos(x-\alpha)$$

$$= k \cos x \cos \alpha + k \sin x \sin \alpha$$

$$k \cos \alpha = 3$$

$$k \sin \alpha = 2$$

$$k = \sqrt{3^2 + 2^2}$$

$$= \sqrt{9 + 4}$$

$$= \sqrt{13}$$

$$\tan \alpha = \frac{\sin}{\cos} = \frac{2}{3}$$

$$\alpha =$$

$$\begin{array}{c|c} \checkmark S & \checkmark A \\ \hline T & C \checkmark \end{array}$$

$$3 \cos x + 2 \sin x = \sqrt{13} \cos(x -$$